ERCB

EnCana Oil and Gas Co. Ltd.
Well Blowout
15-20-19-08W4M
October 2, 2008

ERCB Investigation Report

June 1, 2009

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Energy Resources Conservation Board

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Contents

1 Incident Overview 1

2 Significant Findings 2
2.1 EnCana Investigation 2
2.2 ERCB Investigation 3

3 Actions Taken to Prevent Recurrence 4
3.1 By EnCana 4
3.2 By the ERCB 4

4 ERCB-Directed Actions 4

5 ERCB Follow-up 5

1 Incident Overview

At about 3:30 p.m. on October 2, 2008, a contractor for EnCana Oil and Gas Co. Ltd. (EnCana) experienced a loss of well control (blowout) while performing well work-over activities on a suspended sweet well located at Legal Subdivision 15, Section 20, Township 19, Range 8, West of the 4th Meridian (Suffield 15-20) on Canadian Forces Base (CFB) Suffield, 14 kilometres southeast of Jenner.

A coil tubing unit and service rig were engaged to complete the well work-over program, which required removing 1-inch coil tubing and downhole tools from the wellbore and running in a larger tubing string. Potassium chloride (KCL) fluid had been used to kill the well, and a tubing dart had been installed and pressure tested to establish a dead well condition.

The well service unit had pulled the 1-inch coil and assembly from the wellbore to about 100 metres (m) from the surface without incident. When the blast joint came through the annular control valve and into the lubricator, it was removed by separating the lubricator assembly at a union above the annular control valve. The annular control valve was pressured up to prevent well flow before the unions were separated, and once the lubricator assembly was hoisted apart exposing the blast joint, the annular control valve failed, which resulted in a blowout.

The blowout resulted in the release of sweet gas, produced water, and formation fracturing (frac) fluid from the wellhead, which was located below ground level in a caisson. The gas was dispersed by light winds, while the produced water (approximately 3–4 cubic metres [m^3]) and the frac fluids were contained in the caisson. There was no one in the caisson at the time of the failure and personnel on site moved to a safe area.

EnCana activated its emergency response plan (ERP) and set up a local incident command centre and an emergency operations centre at its Calgary office. EnCana engaged well control specialists (HSE Integrated [HSE]), and fire and well control equipment and personnel were dispatched to the site.

At 4:00 p.m., the Suffield Industry Range Control (SIRC) was notified of the release and it notified CFB Suffield at 4:15 p.m. The ERCB Medicine Hat Field Centre (MHFC) was notified at 6:30 p.m. and immediately dispatched staff to the site. The MHFC notified the ERCB Emergency Response Group (ERG) at 6:42 p.m.

At 6:30 p.m., HSE fire control personnel arrived on site, and at about 7:00 p.m., stationary air monitoring, wind socks for wind direction, and tower lighting were established. At about 8:30 p.m., ERCB staff arrived on site, and the stationary monitors recorded lower explosive limit (LEL) levels of 100 per cent 50 m from the well, decreasing to 0 per cent 500 m from the well, resulting in the establishment of a safe zone.

At 9:30 p.m., HSE well control specialists arrived on scene and a plan to control the well was submitted to the MHFC at 10:00 p.m. Through consultation with EnCana, the MHFC, and the ERG, the decision was made to stand down operations for the night for worker safety. The well site was monitored throughout the night by HSE and EnCana staff.

By about 9:00 a.m. on October 3, 2008, the sweet gas was dissipating and the amount of produced water released had increased to an estimated total of 35 m^3 (25 m^3 contained in the caisson and 10 m^3 on the ground around the caisson). Operations to regain well control commenced with vacuum trucks removing the fluid from the caisson, but the volume was more than expected (release flow now estimated at 12 m^3 per hour).

Well control operations were suspended until fluid storage tanks and additional vacuum trucks were available on site. At 2:00 p.m., operations resumed, with vacuum trucks removing the fluid from the caisson. The lubricator assembly was lowered onto the failed annular control valve to divert flow to the rig tank. HSE staff connected the union between the failed annular control valve and the lubricator assembly. At 3:00 p.m., well control was achieved and the incident called down.

Pratum Resource Consultants Ltd. (Pratum) was contacted by EnCana to inspect and assess the impacts of the release.

Pratum developed a reclamation/remediation work plan that was approved by SIRC. On November 7, 2008, Pratum removed the impacted material from the well caisson, excavated the impacted area surrounding the well, and collected soil samples.

The well site is situated on fairly level land with slopes no greater than 1 per cent to the northeast and south. The released fluids ran no farther than 25 m northeast and south from the well centre. All fluids remained on site and none of the fluids that were released were detected below a depth of 1.0 m.

On November 13, 2008, Pratum resampled the base of the excavated area and coordinated transportation of the impacted material. A total of 540 tonnes (about 320 m^3) of impacted soil was removed from the site and transported to the CCS Newell Landfill for disposal.

A 71 m^3 volume of fluid was transported to the Newalta Brooks facility for disposal (4.42 m^3 of 3 per cent KCL and 66.58 m^3 produced water). EnCana estimated that about 670 mcf (18 974 m^3) of gas was released to the atmosphere based on a calculated absolute open flow potential (AOFP) for this zone 670 mcf/d.

On November 20, 2008, clean fill and topsoil were imported, and the disturbed area was backfilled, topsoil was spread, and the area was seeded with an approved native seed mix. Weed control will be conducted during spring and summer 2009, and the area will be monitored for successful vegetation establishment.

The incident was classified as a level-2 emergency by the ERCB and occurred on a restricted area of CFB Suffield. The incident received media attention and a press release was issued by the ERCB Communications Group that the incident would be investigated.

2 Significant Findings

2.1 EnCana Investigation

EnCana identified multiple factors (human error and equipment failure) that contributed to the well blowout:

- The annular control valve failed.
- There was a lack of knowledge regarding the manufacturer's recommendations for operating the annular control valve.
- Hydraulic problems on the coil tubing unit caused over pressure of the annular control valve.
- Lubricator/blowout preventer (BOP) lifting procedures were not defined for operations.
- The wellbore residual pressure was underestimated with insufficient fluid volume on location to kill the well.

- The well service program did not have an up-to-date wellbore schematic to identify downhole equipment.
- The lubricator/BOP setup was nontypical on the coil tubing unit and there was a failure to use a second annular control valve on location.
- A decision was made to remove the lubricator although there existed uncertainty about the effectiveness of the well control.
- There was a lack of communication that occurred between the consultant and the contractor during operations.
- A hazard assessment was not completed on location and the management of change program was not initiated when there was a deviation from the well service program.

2.2 ERCB Investigation

The ERCB's investigation included a review of existing regulatory documents, other investigation reports, and information captured by field staff at the time of the incident. The ERCB has fully reviewed EnCana's evaluation of the incident, including the technical explanation of the nature and circumstances of the blowout. The ERCB is satisfied that human error and equipment failure were the cause of the well blowout.

The following documents were considered in the ERCB investigation:

- *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry*
- *Directive 037: Service Rig Inspection Manual*
- *Directive 033: Well Servicing and Completions Operations – Interim Requirements Regarding the Potential for Explosive Mixtures and Ignition in Wells*
- Industry Recommended Practice[1] (IRP) 21: Coiled Tubing Operations (under development)

The ERCB has determined that there were contraventions of its regulatory requirements under *Directive 033*, Section 1, and *Directive 037*, Appendix 1045, Section 52(1).

The ERCB had an appropriate response to the incident and used all the necessary resources (ERG, MHEC staff, ERCB Communications Group, and incident investigator).

EnCana had an appropriate response to the incident and used all the necessary resources.

All required agencies were contacted (ERCB, Workplace Health and Safety, SIRC, Environment Canada, Alberta Environment Support, and Emergency Response Team, and Alberta Emergency Management Agency).

EnCana maintained communication with and provided updates to all the parties throughout the incident.

[1] An IRP is a set of best practices and guidelines prepared by knowledgeable and experienced industry and government personnel. IRPs are intended to provide management and operators in the Canadian oil and gas industry with advice on relevant topics. The practices set out in IRPs form the basis for minimum standards for the industry.

3 Actions Taken to Prevent Recurrence

3.1 By EnCana

The EnCana investigation report identified a number of actions to prevent and better manage any future incidents specifically with regard to the Sufficld 15-20 wellbore configuration. EnCana has developed an action plan to address all of the recommendations, which are summarized below.

- ensure the use of proper equipment for well control and maintain two well control devices during all servicing activities involving wellbores equipped with annular control valves,
- ensure that downhole schematics are available and are part of the well service program and that all contractors are aware of the program and equipment requirements,
- review the Fire and Explosion Hazard Management Program and ensure compliance with the program, and
- ensure effective communication channels for decision-making and management of change.

EnCana will issue a safety alert to be circulated within EnCana and to other licensees and operators through contact with peer company representatives working on industry committees such as the IRP 21 Coiled Tubing Committee.

On March 27, 2009, EnCana successfully addressed the High Risk enforcement actions described in Section 4.

3.2 By the ERCB

The MHFC will continue to follow up with EnCana on an ongoing basis and will confirm that EnCana has enhanced its well service program as summarized above.

4 ERCB-Directed Action

High Risk Enforcement Action 1 was issued on March 13, 2009, for "using an inadequate preventer," as stated in *Directive 037*, Appendix 1045, Section 52(1). There was no adequate preventer installed on the wellhead during the tripping of the small diameter tubing string.

Another High Risk Enforcement Action 1 was also issued on March 13, 2009, for noncompliance with *Directive 033*, Section 1, which states:

> Licensees must
>
> - have documented practices available at the well site for the safe management of the potential for explosive mixtures and ignition in wells and associated surface equipment, and
> - ensure that all well site staff responsible for well control and blowout prevention understand these practices and know how to apply them.

There was no *Directive 033* documentation available on site.

The ERCB directs that EnCana submit a safety alert to Enform to ensure that knowledge relating to this incident is shared with industry.

5 ERCB Follow-up

- The MHFC will follow up with EnCana regarding its commitment to share its knowledge relating to the incident with other operators.
- The MHFC will follow up with EnCana on the implementation of the ERCB directed action.
- The ERCB Well Operations Group and Field Surveillance Branch will continue working with the Coiled Tubing Committee on the development of IRP 21.
- The ERCB will post the investigation report on its Web site www.ercb.ca.